



HISTORIC PRESERVATION AND SUSTAINABILITY

This document is intended to provide guidance to property owners in Cheltenham Township on sympathetic “green” retrofits for existing buildings. The goal is to reduce the overall energy consumption associated with existing and historic buildings, while at the same time maintaining the historic character of Cheltenham’s neighborhoods. It is written from the viewpoint of preservation and is not intended to act as a thorough discussion on “green” building technology.

Climate change is an ever-growing concern throughout the world and within our communities. As a result, goals for reducing energy consumption have been set at all levels of government, from the world stage to municipal governments. This raises a number of critical questions at the local level of government: What can our communities do to stem the tide of climate change? How is preservation related to environmental sustainability, and can preservation help achieve sustainability goals? How can homeowners, with the help of local government, adapt historic properties to be more energy efficient while maintaining the historic character of the properties?

Residential buildings are responsible for a large portion of the energy consumed in the United States. They currently account for 20.5% of the overall carbon emissions and 36% of all of the electricity that is consumed. With a number of improvements in energy efficiency, the energy consumption statistics associated with residential use can be drastically reduced.



Note the shade provided by the porches and the surrounding trees. These elements keep the house cooler in the summer months.

These guidelines were developed in conjunction with Cheltenham Township’s Boards of Historical and Architectural Review (BHAR). The BHARs review Certificate of Appropriateness (COA) applications for proposed exterior alterations that are visible from the public right-of-way within the LaMott and Wyncote Historic Districts. The COA applicant is responsible for complying with the provisions of the Zoning and Building Codes at the time of application. The applicant must obtain a COA as well as all necessary permits prior to proceeding with any work. For more information, or to obtain permit applications, please call the COA Administrator at 215-887-6200, extension 215.

This brochure is intended only as a guide, is not regulatory in nature, and should not replace professional guidance. Although the information presented in this brochure is based on current knowledge and practices, Cheltenham Township and its historic preservation consultant, Cultural Heritage Research Services, Inc. (CHRS, Inc.), do not accept liability for any losses or damages resulting from its use.

The “greenest” buildings are those that are already standing. Existing buildings, including historic buildings, represent an energy investment that has already been expended in the procurement, manufacture and transport of materials, and the construction process itself. To demolish an existing building to build a new “green” building in its place is counter-productive to the concept of energy conservation. By some estimates, it would take over 65 years to recoup the energy savings of demolishing an existing building and replacing it with a new “green” building. Preserving materials in place, with sensible, sympathetic “green” retrofits, is an efficient use of resources. Although historic buildings utilize older technologies, they can be *more* efficient than those buildings constructed in recent years. For example, the United States General Services Administration, which is the single largest property owner in the nation, completed energy audits on its buildings and found that the utility costs associated with historic buildings were, on average, 27% less than those costs in more modern buildings (www.preservationnation.org/issues/sustainability/additional-resources/sustainability-numbers.html).



Note the extensive surrounding trees, deep porch, and masonry walls. These elements assist in keeping historic houses cooler in summer months.

The National Park Service and the Secretary of the Interior’s Standards and Energy Conservation

In the United States, the *Secretary of the Interior’s Standards for the Treatment of Historic Properties (Standards)* is the basis for most preservation regulations at the local, state and

national levels of government. The *Standards* is divided into four different philosophical categories: Preservation, Rehabilitation, Restoration and Reconstruction. The most commonly used approach, Rehabilitation, can easily dovetail with “green” building practices, but may require innovative and creative design solutions to both meet the *Standards* and the energy conservation goals. In the *Standards* for Rehabilitation, Preservation, and Restoration, different methods to increase energy efficiency are briefly discussed, but not in a substantive way. Due to the complex nature of most projects involving historic buildings, property owners must seek out creative solutions, involving a team of professionals including conservators, historic preservationists, architects, and engineers to determine the best balance between energy goals and retaining historic fabric to comply with the *Standards*.

The *Standards* does not provide specific advice. Instead, it offers brief, general guidelines. For example, the discussion of historic windows as energy efficient, which is an undoubtedly complex subject, is limited to the following (www.nps.gov/history/hps/tps/standguide/rehab/rehab_energyeff.htm):

Recommended:

- Utilizing the inherent energy conserving features of a building by maintaining windows and louvered blinds in good operable condition for natural ventilation
- Improving thermal efficiency with weather-stripping, storm windows, caulking, interior shades, and if historically appropriate, blinds and awnings
- Installing interior storm windows with airtight gaskets, ventilating holes, and/or removable clips to ensure proper maintenance and to avoid condensation damage to historic windows
- Installing exterior storm windows which do not damage or obscure the windows and frames

Not Recommended:

- Removing historic shading devices rather than keeping them in an operable condition

- Replacing historic multi-paned sash with new thermal sash utilizing false muntins
- Installing interior storm windows that allow moisture to accumulate and damage the window
- Installing new exterior storm windows which are inappropriate in size or color
- Replacing windows or transoms with fixed thermal glazing or permitting windows and transoms to remain inoperable rather than utilizing them for their energy-conserving potential

Also at the Federal level, the National Park Service's *Preservation Brief 3: Conserving Energy in Historic Buildings* and *Preservation Brief 24: Heating, Ventilating, and Cooling Historic Buildings* offer more detailed approaches for reconciling increased energy efficiency and maintaining the historic character of buildings.

Appropriate Methods for “Greening” Historic Buildings

If you own an historic home, what can you do to “green” your building without detracting from the historic character? Before beginning any major alterations, it is imperative to look at the *entire* building with a whole-building energy audit by a professional energy auditor. This will illuminate areas where energy is being lost, the manner in which it is being lost, and how it is used in your building. An energy audit is necessary because it will maximize the return on investment into the property.

Before you get started on projects to increase the energy efficiency of your historic building, it is important for you, and any contractors involved in the project, to understand that the needs of historic buildings are different from those of modern buildings. Factors to keep in mind as you are planning your projects include: the construction techniques employed in building, how you can minimize damage to the historic fabric, the need for your building to “breathe,” ways to minimize damage through unwanted condensation, and the movement of moisture through the historic fabric. Historic buildings were constructed as a system, so careful consideration must be given in order to understand the implications of changing elements of the entire system. Although it is important to make

sure your building is energy efficient, you should consult with a professional to make sure that your building maintains healthy air cycling.

Areas that may be altered to improve energy efficiency, while at the same time preserving the character of historic buildings are: insulation, draft proofing, modifications to windows and doors, efficient appliances, HVAC, landscaping, solar panels and rainwater retention systems. Please consult Cheltenham Township's Engineering, Zoning and Inspections Department to determine if your “greening” plans require any permits or Board of Historical and Architectural Review (BHAR) approval of Certificate of Appropriateness (COA) applications.



Using exterior storm windows is an effective method for reducing energy losses in historic buildings.

Any time you make changes to your mechanical systems or make your building unusually air tight, it is important to contact Cheltenham Township's Building and Zoning Department in order to make sure your building systems are functioning properly and that they are maintaining adequate combustion air and air cycles within the building.

Insulation

Adding insulation in key areas may reduce the heat loss in the winter and heat gain in the summer months. Care should be taken and a professional should be consulted during this process in order to develop a system that will work within the context of your whole building. This will help to create a building that is energy efficient, while at the same time maintaining healthy air cycles within your building. The insulation needs of a load-bearing masonry building are very different than those of a wood-framed building. When selecting methods for insulation, it is important to consider moisture and condensation concerns, “stack effect,” roof shape and pitch, and interior finishes (such as drywall versus plaster). If done properly, adding insulation will not affect the historic character of a property and will result in energy savings.

Draft Proofing

Draft proofing your building will increase the comfort levels of the inhabitants. This can include caulking around windows and doors, adding weather stripping around windows and doors, caulking interior wood trim, assuring that dry-walled areas are properly finished (especially at the wall-ceiling juncture), making sure that masonry walls are properly and completely pointed, and

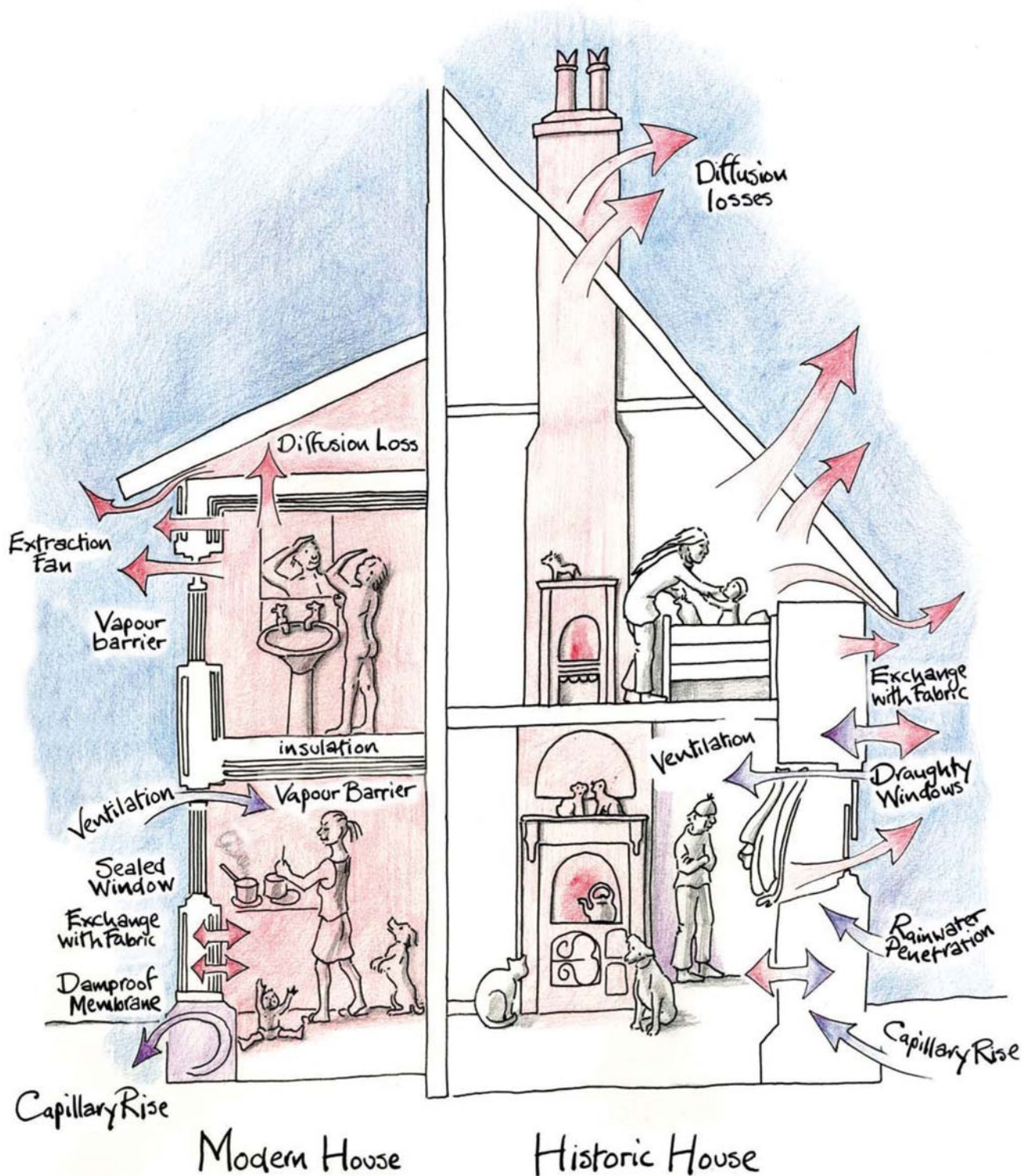
adding insulation around electrical outlets and light switches on exterior walls (foam pads, available from most hardware stores, can be placed on the bottom side of the plate and can be effective at reducing drafts). Note that buildings require proper ventilation, so if necessary, involve a professional. It is best to follow the manufacturer’s recommendations and use high-quality, silicone caulk that matches your wood trim. If you cannot find a caulk to match, most silicone caulks can be painted to match after the caulk has fully cured.

HVAC

If your current heating and cooling systems are outdated and inefficient, working with a professional energy auditor will be especially worthwhile in order to find the most efficient system within the context of your building. If a professional is not involved with the installation, it is best to research and seek out products with an ENERGY STAR® rating. Adjusting the thermostat to maintain cooler temperatures in the winter and warmer temperatures in summer months will reduce energy costs. Furthermore, homeowners should also consider installing timed thermostats that automatically adjust the temperature of the house on a schedule.



Window and door frames should be properly caulked so as to reduce air infiltration into your building.



Historic homes and modern homes have different needs. For example, to maintain adequate ventilation, historic homes need to cycle air through the building at a rate of nearly twice that of modern homes. Most historic homes exceed this rate of air transfer, so draft proofing is generally recommended. If you are unsure of your ventilation rates, please consult a professional energy auditor. (Graphic is from "Energy Conservation in Traditional Buildings," printed by English Heritage in 2008. Accessible at www.climatechangeandyourhome.org.uk/live/content_pdfs/526.pdf.)

Windows

It is often incorrectly assumed that in order to increase the energy efficiency of a house, you must replace the historic windows. Oftentimes the cost associated with replacement windows is not necessarily recouped in energy savings. Furthermore, historic windows that are in good repair and in proper working order, especially when combined with exterior storm windows and weather stripping, can perform almost as well as modern replacement windows. It is advantageous to repair and retain the historic windows because it maintains the historic character of the building and does not result in landfill waste. Before replacing historic windows with modern windows, an analysis should be completed in order to evaluate the potential costs and savings benefits in a whole-building energy audit. If an entire-building audit is not a feasible alternative for you, window performance should be analyzed to fully understand the potential gains or losses associated with changing the window system. If exterior storm windows are not present, the installation of exterior storm windows should be considered; this treatment is preferred to removing historic windows because it is a reversible treatment.

Doors

Doors in historic buildings, especially at the primary entrance, are often character-defining features. Similar to windows, when historic doors are in proper working order, they can perform nearly as well as modern replacements. Historic doors should fit snugly in their frames, with care taken to ensure that there are no gaps or areas of potential air infiltration. Weather stripping will further assist in reducing air infiltration.

Appliances

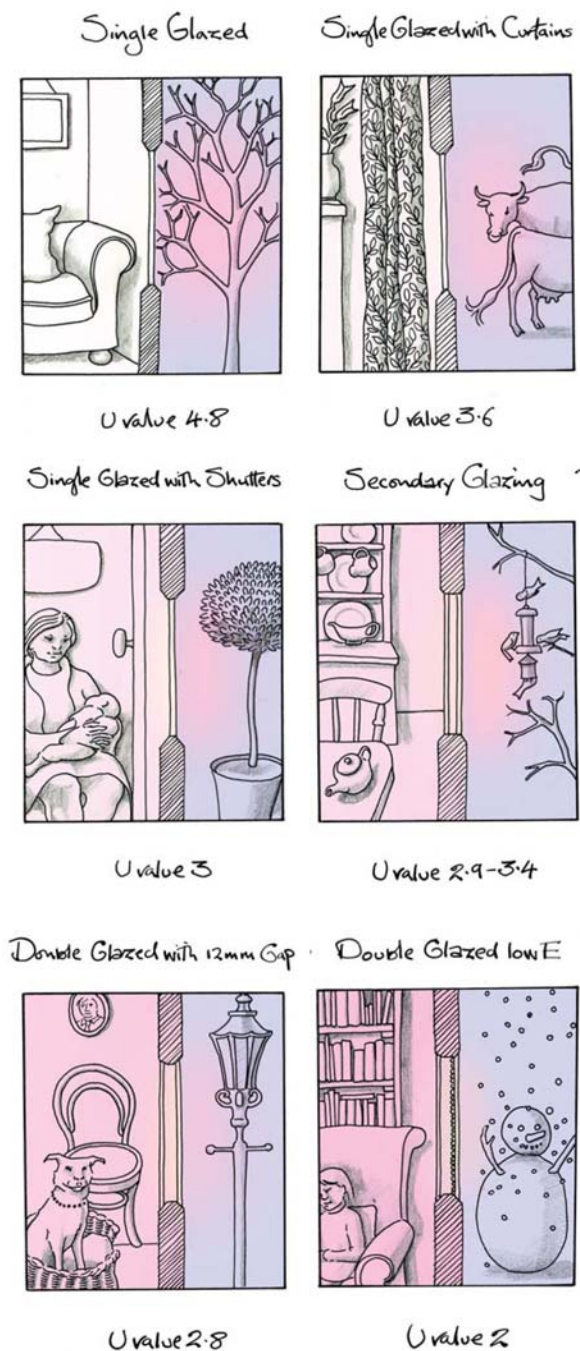
When replacing appliances, it is best to replace older appliances that are at the end of their lifespan with efficient, ENERGY STAR® units to reduce energy consumption. Energy savings can result from small steps, such as replacing incandescent light bulbs with compact florescent light bulbs.

Definitions

R-Value: The R-value is a measurement of an object's resistance to heat loss, so higher R-values are an indicator of higher energy efficiency.

U-Factor: The U-factor measures the rate of heat transfer through an object, so the lower the U-factor, the lower the amount of heat loss (see the figure for illustrations showing U-factors for different window configurations).

Stack Effect: The stack effect is movement of air through a building or chimney due to the changes in air density that result from changes in temperature or humidity.



Different U-factors for alternate window configurations and treatments (Note that this graphic originates from the United Kingdom, where the U-Factor is referred to as the U Value. Graphic is from "Energy Conservation in Traditional Buildings," printed by English Heritage in 2008. Accessible at http://www.climatechangeandyourhome.org.uk/live/content_pdfs/526.pdf).

Alternative Energy Sources

The installation of solar panels within historic districts and on historic buildings may present a conflict with the *Standards* if done unsympathetically. When considering the installation of solar panels on an historic property, the visual and physical impact to the property must be considered and steps must be taken to minimize the impacts. For example, in order to meet the *Standards*, solar panels should be located on the back elevation or on an outbuilding, rather than on an elevation that will be visible from the street. It bears noting that even when a creative design team is employed, the introduction of solar panels to historic properties will not always meet the *Standards*. If the panels are to be installed on an historic roof, the historic fabric of the building may be damaged, which does not comply with the *Standards*.

Geothermal energy may, in many cases, be a more appropriate form of alternative energy source in historic districts. Geothermal systems are more easily camouflaged and will not have the same visual impact within an historic district.

Landscaping

Oftentimes, landscaping plays a key role in reducing energy costs. For example, deciduous trees planted near the south elevation of a building can play a role in cooling the house in the summer, whereas planting evergreen trees near the north and west elevations creates a wind block. It is important to install all plantings away from your building in order avoid trapping unwanted moisture. When possible, landscape with native plant material.

Rainwater Retention

Rainwater retention systems can be installed to conserve rainwater for landscaping purposes. Care should be taken during installation to minimize the visual impacts from the pedestrian level at the sidewalk.

Suggested Further Reading

National Trust for Historic Preservation Sustainability Forum:

<http://www.preservationnation.org/issues/sustainability/>

Secretary of the Interior's Standards for the Treatment of Historic Properties:

<http://www.nps.gov/hps/tps/standguide/>

Making Your Historic Building Energy Efficient, Volumes 1 and 2, prepared for the City of Boulder, Office of Environmental Affairs by Synertech Systems Corporation:

http://www.preservationnation.org/issues/sustainability/additional-resources/boulder_sustainability_volone.pdf

http://www.preservationnation.org/issues/sustainability/additional-resources/boulder_sustainability_voltwo.pdf

U.S. Department of Energy, Energy Efficiency and Renewable Energy:

<http://www1.eere.energy.gov/buildings/residential/cold.html>

United States Green Building Council:

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=124>

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Please contact the Township to see if your "greening" project requires a permit. Please call the COA Administrator at 215-887-6200, extension 215.

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CHRS, Inc., of North Wales, Pennsylvania prepared this publication.

Opportunities for Quick “Green” Fixes on Historic Buildings

If you are not ready to call in an energy audit professional, you can begin “greening” your building with some straightforward alterations that will increase energy savings and at the same time preserve the historic character of Cheltenham’s historic buildings. **Please consult Cheltenham Township’s Engineering, Zoning and Inspections Department to determine if your “greening” plans require any permits or BHAR approval of COA applications.**

- Caulk the interior casings and frames around your windows and doors to seal any air leaks
- Add weather stripping to your doors and windows
- Make sure that existing storm windows are in good operation and repair as necessary
- Ensure that the glazing putty on historic windows is in good condition and patch or replace as necessary
- Make use of interior and exterior shutters
- Add plastic sheeting between your curtains and windows during colder winter months to reduce heat loss and drafts
- In summer months, make full use of operable double-hung sash to naturally increase the airflow and ventilation
- Install interior curtains; if installed over a window opening with single glazing, this alone can change the U-factor for the opening from 4.8 to 3.6
- Caulk the exterior junction between window frames and exterior walls with a high-quality, silicone caulk, following the manufacturer’s recommendations
- Seal leaks that are around electrical outlets and light switch plates on exterior walls
- Caulk your baseboards and interior wood trim to seal air leaks
- Replace incandescent light bulbs with compact fluorescent bulbs
- Install a rainwater retention barrel that utilizes your building’s existing gutter system
- Make sure that your exterior masonry is properly pointed, and consult a professional prior to conducting this work
- Plant deciduous trees on the southern elevation to slow solar gain in summer months
- Plant evergreen trees along the north and west elevations to lessen the effect of winter winds
- When introducing new plant materials or landscaping, use native species

